

FEB 20 2007

PATENT APPLN. NO. 10/809,848
SUBMISSION UNDER 37 C.F.R. § 1.114

PATENT

IN THE CLAIMS:

1. (previously presented) A negative electrode for a rechargeable lithium battery which is obtained by sintering under a non-oxidizing atmosphere, on a surface of a metal foil current collector, an anode mix layer containing a binder and particles of active material containing silicon and/or a silicon alloy;

said negative electrode being characterized in that said metal foil current collector has projections and recesses on its surface, said projections are shaped to have a recurved side face portion that curves more outwardly as it extends closer to a distal end of the projection, and said binder penetrates into spaces defined by said recurved side face portion.

2. (original) The negative electrode for a rechargeable lithium battery as recited in claim 1, characterized in that said projection is shaped to include a narrow portion which defines said recurved side face portion.

3. (previously presented) A negative electrode for a rechargeable battery which is obtained by sintering under a non-oxidizing atmosphere, on a surface of a metal foil current

collector, an anode mix layer containing a binder and particles of active material containing silicon and/or a silicon alloy;

said negative electrode being characterized in that said metal foil current collector has projections and recesses on its surface, said projections are shaped to have a recurved side face portion that curves more outwardly as it extends closer to a distal end of the projection, and said binder penetrates into spaces defined by said recurved side face portions and being further characterized in that said particles of active material penetrate into the spaces defined by the recurved side face portions.

4. (original) The negative electrode for a rechargeable lithium battery as recited in claim 1, characterized in that said current collector has a surface roughness Ra of 0.2 μm or above.

5. (original) The negative electrode for a rechargeable lithium battery as recited in claim 1, characterized in that said current collector comprises a metal foil obtained by subjecting an electrolytic metal to a surface roughening treatment by an electroplating process.

6. (original) The negative electrode for a rechargeable lithium battery as recited in claim 1, characterized in that said current collector comprises a metal foil obtained by subjecting an electrolytic copper or copper alloy foil to a surface roughening treatment by an electroplating process.

7. (original) The negative electrode for a rechargeable lithium battery as recited in claim 5, characterized in that said surface roughening treatment by an electroplating process is cover plating.

8. (original) The negative electrode for a rechargeable lithium battery as recited in claims 1, characterized in that said binder remains undecomposed after the heat treatment for sintering.

9. (original) The negative electrode for a rechargeable lithium battery as recited in claim 1, characterized in that said binder comprises polyimide.

10. (original) The negative electrode for a rechargeable lithium battery as recited in claim 1, characterized in that said particles of active material comprise silicon particles.

11. (original) The negative electrode for a rechargeable lithium battery as recited in claim 1, characterized in that an electrically conductive powder is loaded in said anode mix layer.

12. (previously presented) A method for fabricating a negative electrode for a rechargeable lithium battery, characterized as including the steps of:

providing a metal foil current collector which has recesses and projections on its surface, said projections being shaped to have a recurved side face portion that curves more outwardly as it extends closer to a distal end of the projections;

providing a layer of an anode mix on the surface of the metal foil current collector, the anode mix containing a binder and particles of active material that contains silicon and/or a silicon alloy; and

sintering, under a non-oxidizing atmosphere, the anode mix layer while placed on the surface of the metal foil current collector.

13. (original) The method for fabricating a negative electrode for a rechargeable lithium battery as recited in claim 12, characterized in that said anode mix layer can be provided on the

surface of the metal foil current collector by dispersing the particles of active material in a solution of the binder to prepare a slurry and applying said slurry onto the surface of the metal foil current collector.

14. (original) A rechargeable lithium battery characterized as including a negative electrode comprising the negative electrode as recited in claim 1, a positive electrode containing a positive electrode material, and a nonaqueous electrolyte.

15. (original) A rechargeable lithium battery characterized as including a negative electrode comprising the negative electrode fabricated by the method as recited in claim 12, a positive electrode containing a positive electrode material, and a nonaqueous electrolyte.

16. (new) The negative electrode for a rechargeable lithium battery as recited in claim 11, characterized in that said electrically conductive powder is made from copper, nickel, iron, titanium, cobalt, an alloy or mixture thereof.